Socioeconomic Gradients in Birth Outcomes Across Race, Ethnicity and Nativity

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SES and Health

- Well-established relationship between SES & health
- SES as 'fundamental cause' of disease
  - Those of higher status are able to obtain more knowledge, power, social connections, and other resources to improve their health and that of their families (Link and Phelan 1995)

SES/Health Gradients

- Evidence of graded relationship b/w SES and health
  - Differences not just b/w rich and poor
  - Differences throughout the SES distribution
    (Marmot et al.1987)
- More recently, SES health gradients have been found for child health
  (Case et al. 2002, Chen et al. 2002, 2006)

Birth Outcomes

- Evidence of graded relationship b/w SES & birth outcomes:
  - Both parents' education / occupation and low birth weight, small for gestational age, and preterm birth
    (Parker et al. 1994)
  - Income and infant mortality and low birth weight (Finch 2003)
  - However, evidence of threshold effect, beyond which higher levels of SES do not convey further benefits

Disparities by Race/Ethnicity

- In US also large health disparities by race and ethnicity
  - Black children are more likely to be poor and have worse health outcomes
    - Low birth weight
      - Black 13.4% vs. white 6.9% (NCHS)
- However, some groups are poor, but don't have worse outcomes
    - Mexicans, some immigrants
    - 'Epidemiologic paradox'

SES/Health Relationship

- SES/Health relationship may be different for different groups
- Few (2) studies have looked at SES/health relationships by race/ethnicity
  - SES gradients found for white and black children, but not for Hispanic and Asian children (Chen et al. 2006)
    - But only for some health outcomes
    - Data from 1994
  - SES gradients found for white and black children for LBW and SGA, but not preterm birth (Parker et al. 1994)
    - But, only for some measures of SES
    - Data from 1988

Gaps in Prior Literature

- No recent evidence
- No (or little) information about some groups: Asians, Native Americans, Hispanics
- Few controls
- Inconsistent results

Aims of Study

- Describe birth outcomes for a number of racial/ethnic groups in the U.S.
- Identify whether SES gradients exist for birth outcomes
- Identify whether SES gradients are present across all racial/ethnic groups

Contributions

- New, nationally representative data
- Large samples of groups which have not been examined previously
- Have birth outcomes
- Rich set of SES measures and controls

Data

- Early Childhood Longitudinal Study-Birth Cohort (ECLS-B)
- Nationally representative study of over 10,000 children born in 2001 in U.S.
- Baseline interview at 9 months, follow-up at 24 months, preschool and kindergarten entry
- Birth certificate data are appended
- Oversamples of:
  - low and very low birth weight children
  - twins
  - Chinese, other Asians and Pacific Islanders
  - American Indians

Current Study

- Data from birth certificates and baseline interviews (9 months old)
- Analysis sample = 9,339 children
  - Biological mother was primary respondent
  - No missing data on dependent variables
  - Only one twin per household (dropped 795 matched twins)

Birth Outcomes

- From birth certificate
  - Low birth weight (< 2500 gms)
    - Constructed from continuous birth weight
  - Preterm birth (< 37 weeks)
    - Constructed from continuous gestational age
  - Whether infant stayed in the Neonatal Intensive Care Unit (NICU) after birth

Socioeconomic Status

- SES is a complex and ambiguous concept
  - Evidence that usual measures of SES (education, income, poverty) have very different meanings
  - Evidence that different measures of SES may be incomparable across race
  - Multi-dimensional measures of SES are preferable (Braveman et al. 2001, 2005; Kaufman et al. 1997)

Measures: SES

- Index of 5 SES indicators
  - Education (both parents)
  - Occupation status (both parents)
  - Household income
- Collapsed into quintiles
  - Highest is reference

Race, Ethnicity, Nativity

- Mother's race/ethnicity from birth certificate
  - Non-Hispanic white
  - Non-Hispanic black
  - Mexican
  - Non-Mexican Hispanic
  - Chinese
  - Non-Chinese Asian
  - American Indian
- Nativity from birth certificate
  - US or foreign-born

Sociodemographics

- Mothers' age (BC)
  - <21, 21-30, 31+
- Education
  - <HS, HS, some college, BA+
- Marital status at birth (BC)
- First birth (BC)
- Child's sex
- Multiple birth
- Number of people in family
- Mother lived w/both biological parents till 16
- Region of residence
  - Northeast, Midwest, South, West

Health Behaviors and Medical Risk Factors

- Smoking during pregnancy (either from survey or birth certificate)
- Prenatal care in 1st trimester (BC)
- Any maternal medical risk factor (BC)
  - anemia, diabetes, hypertension, previous LBW or preterm birth, eclampsia, cardiac or lung disease, other

Analyses

- Describe measures across groups
- Show odds ratios of having poor birth outcome at each quintile of SES
  - Reference = highest quintile
  - Crude and adjusted
  - 95% CI's
  - For pooled sample and across groups
- Show predicted probabilities of poor birth outcomes at each SES quintile, across groups
- All analyses use SVY commands in Stata to account for complex design effects in ECLS-B

Unweighted Sample Sizes (Sub-groups are estimates)

	N	% of Full Sample
All	*9339*	100%
White, non-Hispanic	*4300*	46%
Black, non-Hispanic	*1600*	17%
Mexican	*1050*	11%
Other Hispanic	*500*	5%
Chinese	*450*	5%
Other Asian	*950*	10%
Native American	*500*	5%
Native-born	*6800*	73%
Foreign-born	*2550*	27%

Sample Characteristics by Race/Ethnicity

	White, non-Hispanic	Black, non-Hispanic	Mexican	Other Hispanic	Chinese	Other Asian	Native American
Birth Outcomes							
Low birth weight	**5.9**	**11.3***	**5.4**	**7.4***	**4.0***	**7.1***	**4.9**
Preterm birth	**9.7**	**15.5***	**11**	**11.7**	**5.3***	**10.8**	**11.7**
Any NICU Stay	**6.7**	**9.4***	**6.5**	**7.7**	**5.4**	**7.2**	**5.5**
Quintiles of SES*							
1st SES quintile	**10**	**34**	**47**	**25**	**9**	**10**	**26**
2nd SES quintile	**17**	**24**	**25**	**28**	**6**	**13**	**29**
3rd SES quintile	**21**	**20**	**16**	**20**	**8**	**19**	**21**
4th SES quintile	**25**	**13**	**9**	**17**	**12**	**21**	**19**
5th SES quintile	**27**	**8**	**3**	**10**	**65**	**37**	**6**

*Statistically significant differences b/w whites and other groups at the 10% level or better
All figures are weighted using (W1R0)

Sample Characteristics by Race/Ethnicity

	White, non-Hispanic	Black, non-Hispanic	Mexican	Other Hispanic	Chinese	Other Asian	Native American
Categories of Education*							
Less than HS	**17**	**34**	**59**	**40**	**10**	**18**	**37**
HS/GED	**21**	**30**	**18**	**22**	**7**	**16**	**25**
Some college	**29**	**27**	**17**	**24**	**15**	**23**	**29**
College +	**32**	**10**	**7**	**14**	**70**	**42**	**8**
Married	**78**	**33***	**61***	**53***	**97***	**83***	**44***
Lived w/bio pars	**61**	**35***	**67***	**52***	**86***	**75***	**41***
Maternal Behavior and Medical Risk Factors							
Smoked during preg	**19**	**11***	**2***	**6***	**0***	**4***	**27***
Prenatal care 1st tri	**89**	**74***	**75***	**81***	**91**	**85***	**72***
Any med risk factor	**32**	**35**	**25***	**31**	**22***	**24***	**38***

* Statistically significant differences b/w whites and other groups at the 10% level or better
All figures are weighted using (W1R0)

Sample Characteristics by Nativity

	Native-born	Foreign-born
Birth Outcomes		
Low birth weight	6.7	6.6
Preterm birth	10.7	11.6
Any NICU Stay	7.3	6.5
Quintiles of SES*		
1st SES quintile	15	36
2nd SES quintile	20	22
3rd SES quintile	21	16
4th SES quintile	22	14
5th SES quintile	22	13

Sample Characteristics by Nativity

	Native-born	Foreign-born
Categories of Education*		
Less than HS	22	47
HS/GED	23	18
Some college	29	17
College +	26	18
Married	67	69
Lived w/bio pars	55	68*
Maternal Behavior and Medical Risk Factors		
Smoked during preg	17	2*
Prenatal care 1st tri	86	77*
Any med risk factor	32	25*

Figure 1: Unadjusted and Adjusted Odds of Three Birth Outcomes for Full Sample

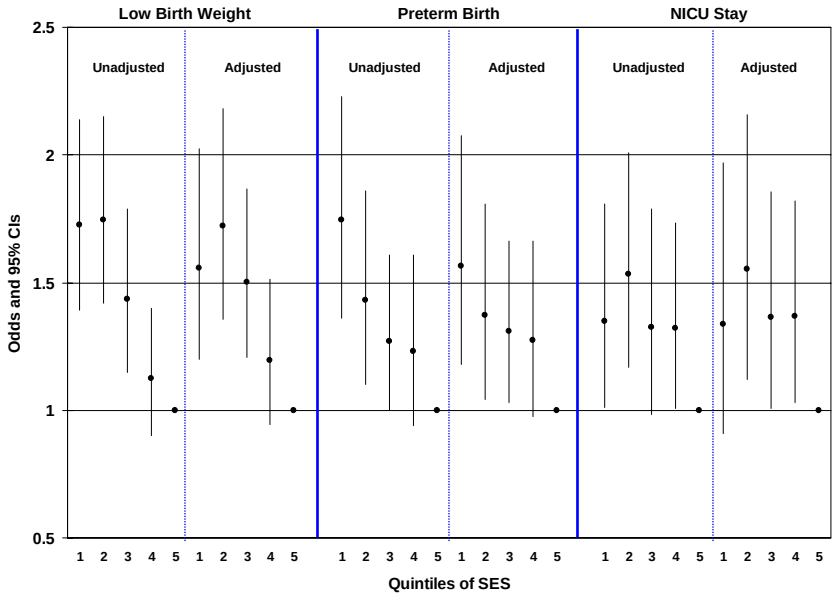


Figure 2: Odds Ratios for Low Birth Weight by Race/Ethnicity

(Adjusted by mother's age, child's sex, and multiple birth)

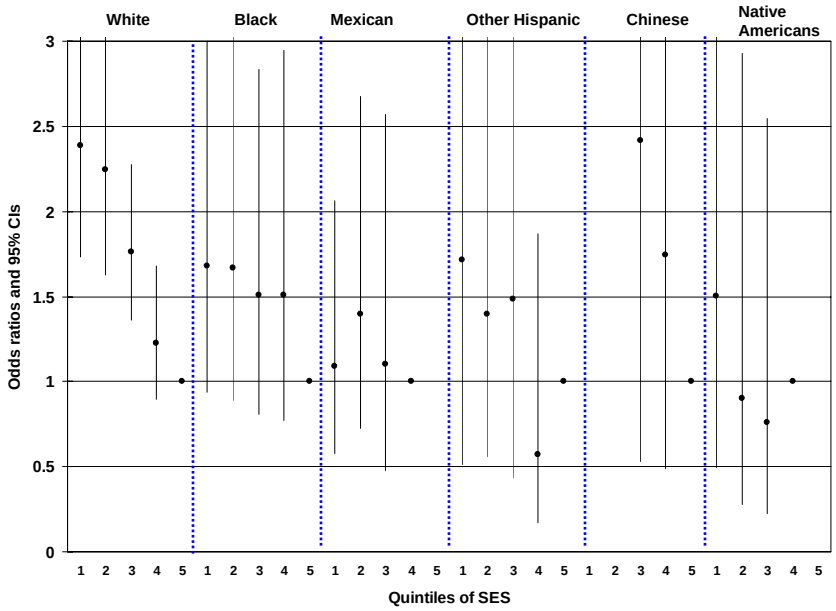


Figure 3: Proportion of Low Birth Weight by Race/Ethnicity

(Adjusted by mother's age, child's sex, and multiple birth)

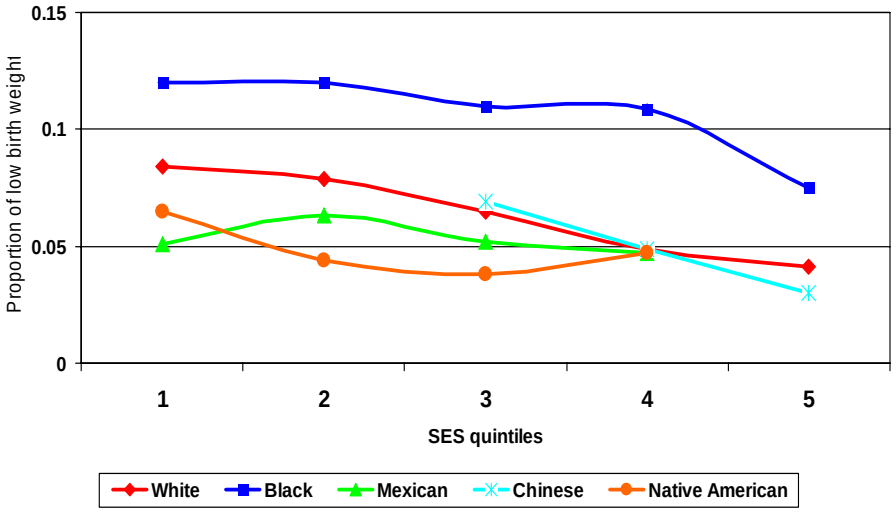


Figure 4: Odds Ratios for Low Birth Weight by Nativity

(Adjusted by mother's age, child's sex, and multiple birth)

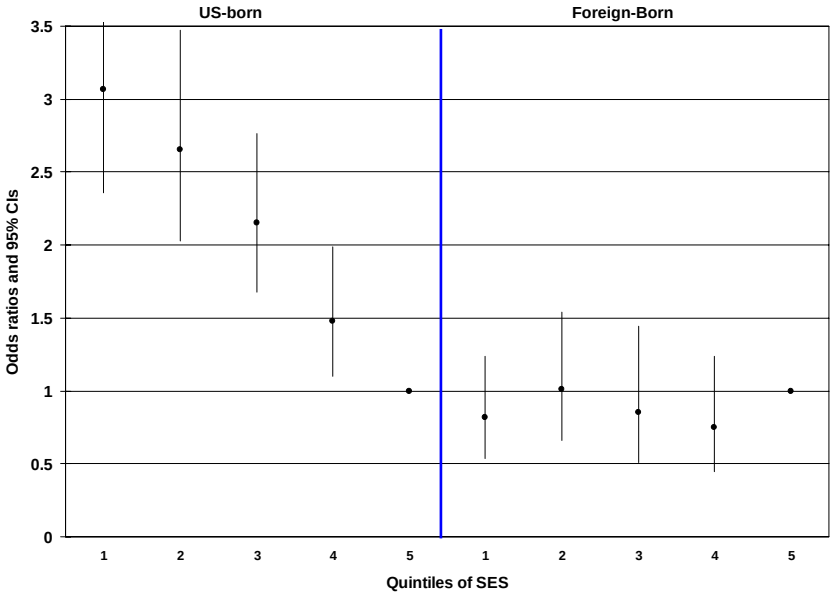


Figure 5: Proportion of Low Birth Weight by Nativity

(Adjusted by mother's age, child's sex, and multiple birth)

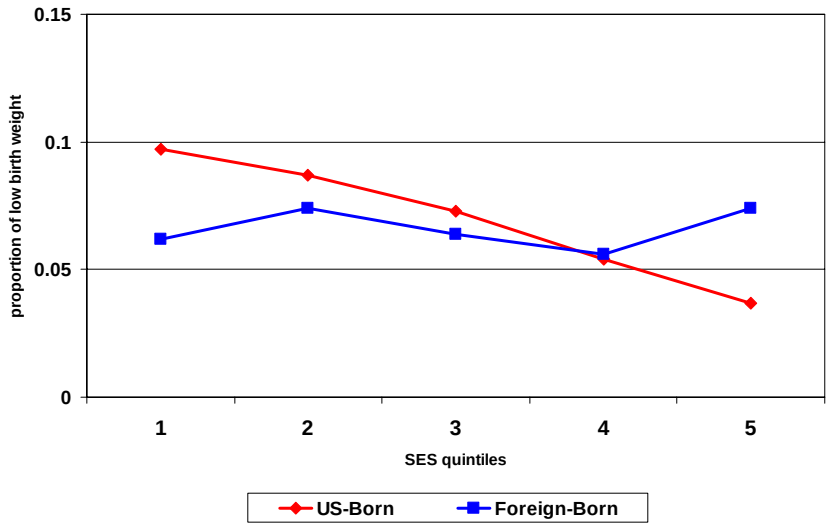



Figure 6: Odds Ratios for Low Birth Weight by Race and Nativity
(Adjusted by mother's age, child's sex, and multiple birth)
Black US-born
Black foreign-born
Odds ratios and 95% CIs
0
0.5
1
1.5
2
2.5
3
3.5
4
1
2
3
4
5
1
2
3
4
5
Quintiles of SES

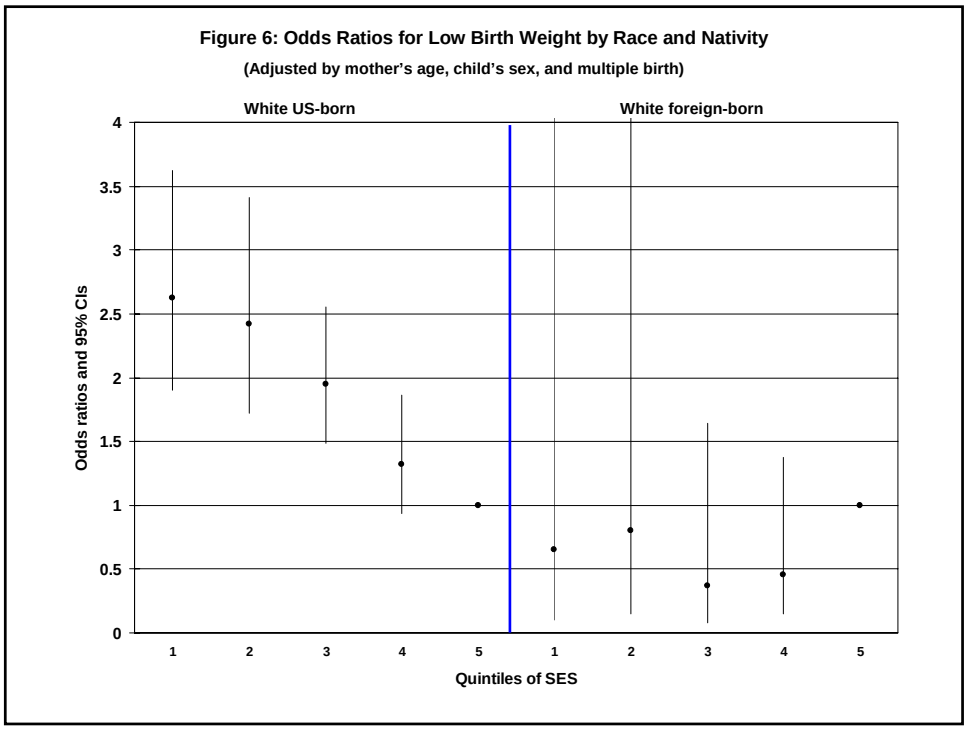


Figure 6: Odds Ratios for Low Birth Weight by Race and Nativity
(Adjusted by mother's age, child's sex, and multiple birth)
White US-born
White foreign-born
Odds ratios and 95% CIs
0
0.5
1
1.5
2
2.5
3
3.5
4
1
2
3
4
5
1
2
3
4
5
Quintiles of SES

Figure 6: Odds Ratios for Low Birth Weight by Race and Nativity

(Adjusted by mother's age, child's sex, and multiple birth)

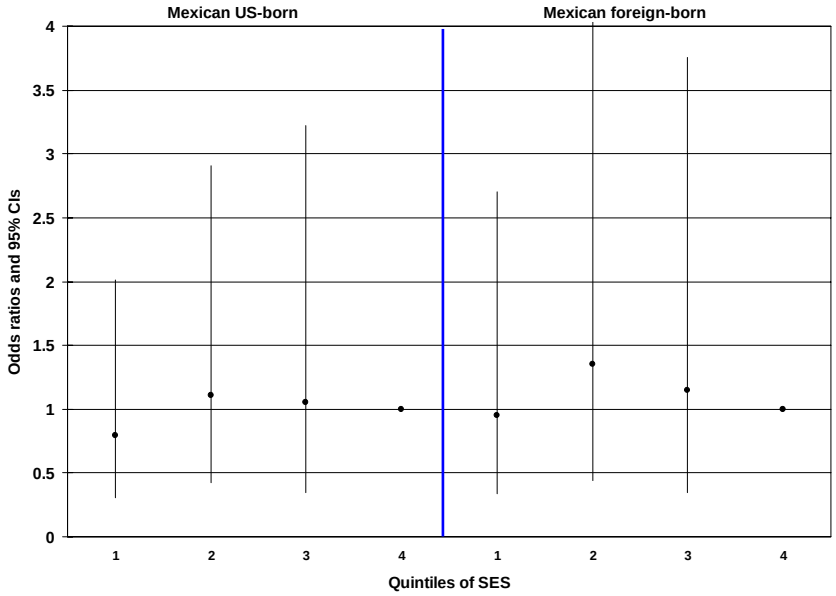
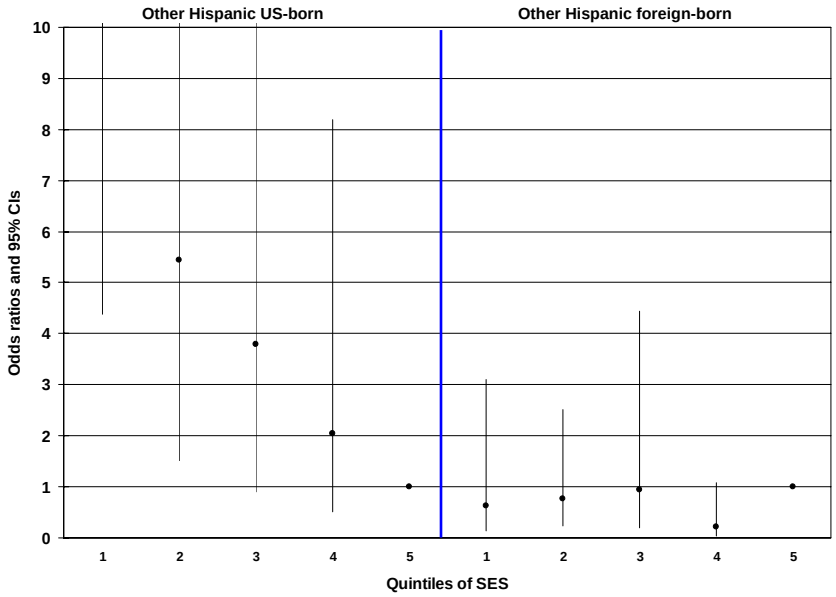


Figure 6: Odds Ratios for Low Birth Weight by Race and Nativity

(Adjusted by mother's age, child's sex, and multiple birth)



Summary

- SES disparities are evident in birth outcomes
- Disparities persist after including controls
- Graded relationship exists for LBW and preterm, but not NICU
- SES/birth outcome relationship:
  - Exists for US-born whites (graded)
  - US-born blacks and US-born non-Mexican Hispanics (beneficial effects only for best off group),
  - No other group
- No SES/birth outcome relationship for foreign-born (of any group)

Discussion

- Disparities in low birth weight by race/ethnicity are different at different points in the distribution
  - Disparities appear greater b/w blacks and whites in middle of distribution for LBW
  - Overall foreign-born rates underestimate advantage
- If SES is not protective, how do we improve birth outcomes and reduce disparities?

Limitations

- Small sample sizes in tails of SES distribution across groups
- Indicators of SES may not be right for certain groups (measurement error)
- SES index not measured pre-birth (reverse causation??)
- Chinese sample appears to be very affluent (??)

Next Steps

- Separate out components of SES
- Add other measures of SES: poverty, wealth, neighborhood
- Look at subsequent measures of child health (do poor birth outcomes predict poor health)
- What are mechanisms?

Thank You

Figure 2: Unadjusted Odds of Low Birth Weight by Race/Ethnicity

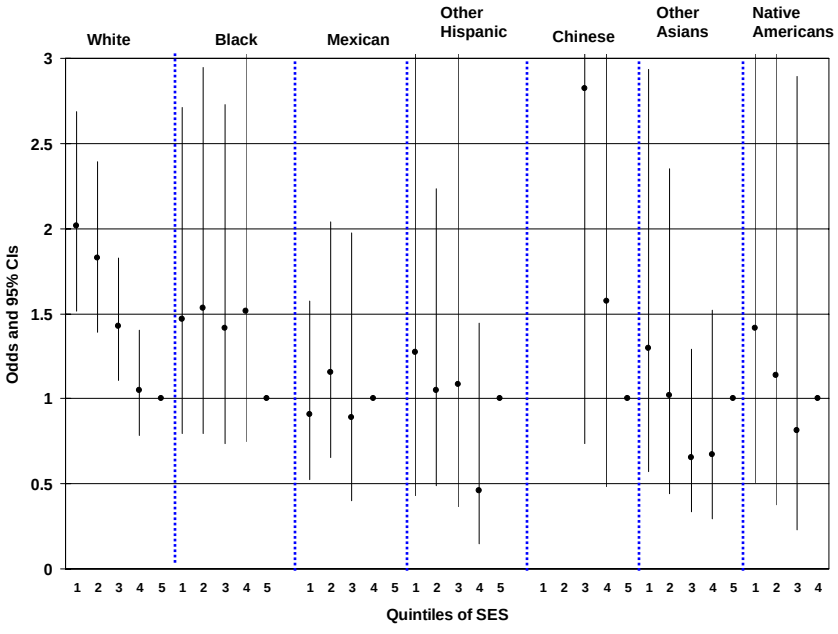


Figure 3: Unadjusted and Adjusted Odds of Preterm Birth for US-born Black and White Mothers

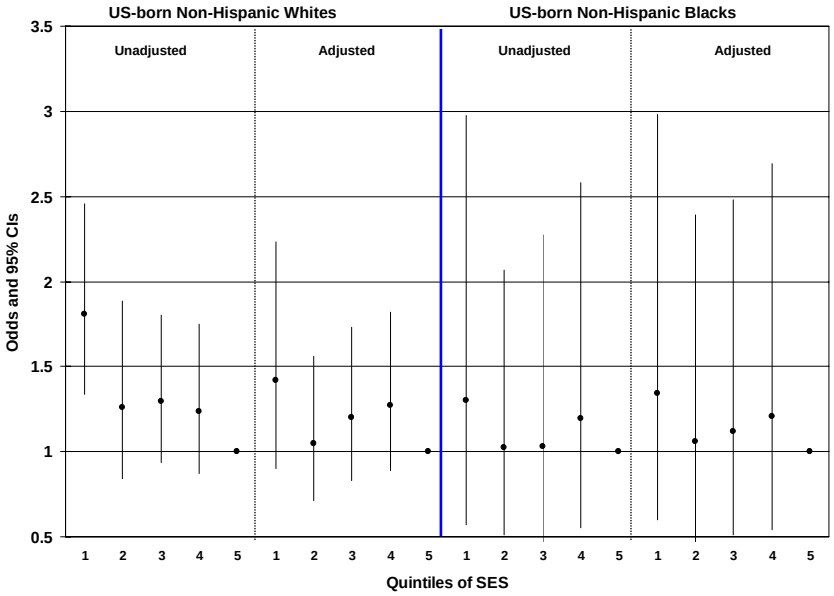
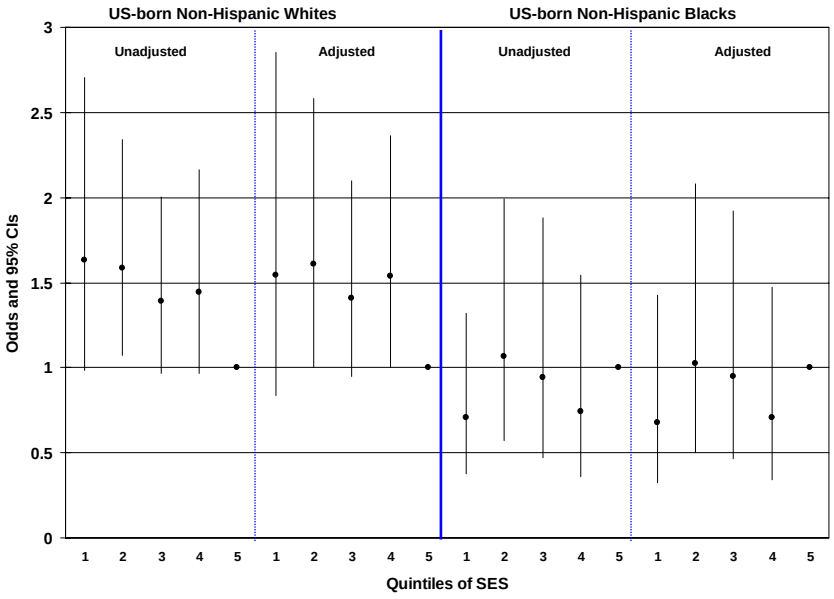


Figure 6: Unadjusted and Adjusted Odds of NICU Stay for US-born Black and White Mothers



SES and Early Child Health

- Lower SES associated with poor birth outcomes
  - Infant Mortality
  - Preterm birth (<37 weeks gestation)
  - Low birth weight (<2500 g)
    - 8.7% of mothers with <high school degree
    - 6.4% of mothers with >= college degree

      (2001 Vital Statistics)